

3 Water Sources For Flow Augmentation

3.1 Introduction

Reclamation's analysis of the capability of the existing water resource to provide flow augmentation for salmon recognizes that the upper Snake River water resource base is essentially fully utilized at present. The over appropriation of natural flows in the early to mid 20th century led to the construction of Federal storage on the main stem and in several tributary basins. That storage space is currently under contract to spaceholders or has been assigned to specific uses. Some of the assigned uses include maintenance of reservoir pools and maintenance of streamflows to help preserve fish and wildlife resources. One of the assigned uses is flow augmentation in the lower Snake River.

These general facts indicate that there is no “free” water supply available in the basin. Water from the upper Snake River could be obtained for flow augmentation in the lower Snake River only by decreasing the amount of water currently used for other purposes. Since most of the water use in the basin is for irrigation, large levels of flow augmentation would necessarily decrease the water supply available for irrigated agriculture.

The purpose of this chapter is to enumerate and describe the sources of water and to identify the amount of water found to be physically available in the basin. Major questions with regard to how the water could be obtained and released for flow augmentation have not been resolved. Water acquisition issues are more fully discussed in chapter 9.

3.2 Potential Water Sources

Generally considered as sources of water are: existing Reclamation storage, existing non-Reclamation storage, new storage, natural flows owned by private individual and entities, groundwater, and water made available by conservation and by elimination of unauthorized water use. The following sections provide information on each water source.

Regardless of the source of flow augmentation water, the effect of using a part of that water supply for flow augmentation would be to reduce the water supply for irrigation. Selection of specific sources by location would shift effects to the area from which water was obtained. It is important to recognize that the programmatic nature of this analysis is not so much site specific as it is regional in terms of effects.

3.2.1 Reclamation Storage

3.2.1.1 Active Space

Reclamation reservoirs have a total of about 7 MAF of active storage space (see table 2-2). Of the active storage space, about 6.3 MAF are contracted to spaceholders. Some portion of this space could potentially be made available for flow augmentation.

Active space also includes about 160,000 acre-feet of space already assigned to flow augmentation. This space would continue to be available. The remaining active space of about 530,000 acre-feet is assigned to a variety of purposes including streamflow maintenance, reservoir conservation pools, and exclusive flood control space. The exclusive flood control space of 27,000 acre-feet is essential for flood control

operations and would not likely be made available for flow augmentation. A portion of the remaining space assigned to other uses could be reassigned to flow augmentation.

3.2.1.2 Inactive Space

Inactive space in Reclamation reservoirs totals about 800,000 acre-feet and is reserved for the operation of powerplants (powerhead), operation of irrigation outlets (irrigation canal head), sediment control, and water quality. It is likely that only the portion used for powerhead could be made available.

Reclamation has, in the past, relied on water in the powerhead space to meet a portion of the flow augmentation commitments in dry years when there was little water in the rental pool. Powerhead space would continue to be made available for flow augmentation in the driest years.

3.2.1.3 Rental Pools

The current operation of Reclamation reservoirs makes possible the development of rental pools through which sellers with excess water can make water available to others with an inadequate water supply. Reclamation has relied on the rental pools to obtain a large portion of the existing 427,000 acre-feet requirement for flow augmentation. These rental pools can operate because a spaceholder contractor may have more water than needed in some years and can carry over that water to the next year or place it in a pool for others to purchase. Under current rules, the space for flow augmentation has last-to-fill status the following year. All other contracted space in the reservoir must fill the next season before water can be placed in the space occupied by the water sold in the previous season. This is primarily an accounting procedure to avoid penalizing spaceholders that do not sell water for downstream uses.

If the flow augmentation requirement remains at 427,000 acre-feet, rental pools could continue to supply a portion of the flow augmentation water.

Acquisition of large amounts of storage space, and annual release of the water that accumulates in that space, would reduce reservoir refill capability. Remaining spaceholders would suffer shortages at levels not previously experienced. The increased likelihood of shortages would be of such scale as to raise serious doubts as to the willingness of spaceholders to consign water to rental pools. As a result, Reclamation considers the rental pools as a source of water only for 427,000 acre-feet.

3.2.2 Non-Reclamation Storage

Reclamation determined that there was insufficient time to gather data to analyze the potential of non-Reclamation storage for flow augmentation.

The only significant federal storage in addition to Reclamation storage is the three BIA facilities that provide water to Indian irrigation projects. Any change in use of that water would require the approval of the tribes.

IPC owns the single largest block of private storage in the basin. IPC operations currently help shape flows for salmon augmentation and provide most of the electric power used in the area.

3.2.3 New Storage

New storage was not evaluated in this analysis. However, new storage sites in the basin have been analyzed in other reports (Corps, 1990; Reclamation, 1994). Construction of such storage would most likely be off-stream by a federal agency and would typically require a lengthy budget, study, and authorization process. Such a process could easily exceed 10 years before initiation of construction with first operation likely to follow in another 5 years. New storage is a potential long-term solution to add large amounts of flow augmentation water. This analysis did not consider new storage, in part, due to the long timeframe for development but also because study and authorization of such development for flow augmentation would require a process separate from the current Corps study.

3.2.4 Natural Flows

Another potential source of water for flow augmentation is natural flows that currently are diverted to irrigate private lands (lands that do not receive water from Reclamation projects). To obtain this water, the natural flow rights to those lands would be acquired, irrigation of those lands would be curtailed, and the flows currently diverted would remain instream for flow augmentation. Reclamation has already purchased the natural flow rights for irrigation of 4,420 acres of farmland in Oregon. The annual amount of water made available by this purchase is 17,650 acre-feet.

For this analysis, Reclamation considered privately irrigated lands in various areas in the Snake River basin upstream of Lower Granite Lake and assumed that the natural flow rights for lands totaling 221,500 acres could be acquired. These lands include:

- 68,000 acres in Idaho near Twin Falls irrigated by highlift pumping
- 30,000 acres in Wyoming upstream of Palisades Reservoir
- 15,000 acres in Nevada (Owyhee River basin)
- 71,500 acres in Idaho (Salmon River basin)
- 37,000 acres in Oregon (Grande Ronde River basin)

The annual amount of water that could be made available by curtailment of this irrigation is estimated at 293,640 acre-feet, the consumptive use for these lands.

In particular, pumping water from the declining aquifer would result in short term increases in flows. Over time; however, the pumping for flow augmentation would reduce natural accretion to the river and result in no long term increase inflows.

3.2.5 Groundwater

The complex relationship between surface and groundwater and the uncertainties existing in an already declining aquifer make it impractical to consider groundwater as a water source in this analysis. One suggestion is to pump water directly from the aquifer to the river and this would result in a short-term increase in flows. However, that pumping from a declining aquifer would reduce natural accretion to the river and result in no long-term increase in flows. Direct pumping would be impractical from an energy standpoint. Theoretically, the most effective means to increase streamflow would be to curtail some

existing groundwater use. This would allow more outflow to streams; however, such water would not be immediately available because of the lag time associated with water movement through the aquifer. As a result of these considerations, Reclamation did not evaluate groundwater as a potential water source in this analysis.

3.2.6 Water Conservation

Since most of the water use in the basin is for irrigation, conservation as a water source would necessarily focus on irrigation. True water conservation within the irrigation sector requires irrigating fewer crops or switching to crops that use less water. Acquisition of Reclamation storage and natural flows for flow augmentation is a method of implementing water conservation.

Increasing conveyance system efficiency (reducing water losses) and improving onfarm water application efficiency is often considered to be water conservation. An increase in irrigation efficiency reduces water diversions and increases flows in the stream reach immediately downstream from the diversion. Further downstream below the point where return flows enter the river, there is no change in total surface flow except for minor changes due to changes in evaporation losses. Because of the geophysical structure of the Snake River basin upstream of Brownlee Dam, essentially all return flows from irrigation water application return to the stream somewhere upstream of Brownlee Dam. From the perspective of a basin water budget, improved irrigation efficiency would provide little or no water for other uses.

Improving water transport and application efficiency is a valuable water management tool and is actively pursued by Reclamation. Reclamation recognizes that improving irrigation efficiency can be valuable to local fish and wildlife resources by retaining flows within the stream but also recognizes that improving irrigation efficiency can result in local environmental degradation by drying wetlands. This may be a tradeoff for increasing local flows to protect and enhance aquatic resources.

In the final analysis, water conservation with respect to irrigation means irrigating fewer acres, and that is what acquiring water from storage or natural flows would do.

3.2.7 Elimination of Unauthorized Use

Lands that can be irrigated using water from Reclamation storage and/or using project facilities are strictly defined on the basis of location and total number of acres. In many areas, land that are not authorized to receive water and/or the total number of acres irrigated exceed that authorized by contract or legislation. This use of water has been ongoing for many years and is, in part, due to new technologies. For example sprinkler technology available since the 1960s allows efficient water application over a large area, but it may be impractical to avoid application of water to small interspersed parcels of land that were originally classified as non-irrigable and therefore not authorized to receive project water. Farmers often plant and harvest those interspersed areas rather than leave them in natural vegetation. In other cases, irrigation of new fields has developed over the years and is the result of intentional unauthorized use of water.

Elimination of all unauthorized use of water would provide very little water for flow augmentation. Simply stopping all instances of unauthorized use would not affect the water entitlements of irrigation districts which could continue to use that water supply on authorized lands, carry the water in storage for use during dry years, or place the water in a rental pool.

A reallocation or reassignment of water would be necessary to make the water available for flow augmentation. Reallocation of 1 MAF of water through acquisition of water for flow augmentation, as discussed in later chapters, would likely eliminate most unauthorized use. As a result, Reclamation did not spend the time to separately estimate the amount of water that might be made available from the possible elimination of unauthorized use.

3.3 Summary

There is a total of 7,815,400 acre-feet of active and inactive storage space in Reclamation reservoirs; of this amount, 27,000 acre-feet is exclusive flood control space leaving a total of 7,788,415 acre-feet of storage space in Reclamation reservoirs that is physically available for all other purposes. Reclamation also identified a natural flows of 311,290 acre-feet of water for flow augmentation use. Although the latter volume is largely arbitrary, it is based on specific acreages of privately irrigated lands including some lands irrigated by highlift pumping. Table 3-1 summarizes the findings on water availability for flow augmentation.

Table 3-1 Water Sources and Amounts Considered Available for Flow Augmentation	
Water Source	Maximum Volume (Acre-Feet)
Reclamation Storage Space	
Contracted	6,320,316
Assigned to flow augmentation	158,829
Assigned to other uses (minus exclusive flood control space)	504,370
Inactive	804,900
Total	7,788,415
Rental Pools	
Districts 01, 63, and 65	Varies from year to year None would be available with a large assignment of storage to flow augmentation
Natural Flows	
Purchased	17,650
Wyoming potential	27,640
Idaho highlift pumping	134,950
Nevada potential	21,900
Salmon River basin potential	87,470
Grande Ronde River basin potential	21,680
Total natural flows	311,290
Non-Reclamation Reservoirs	Not evaluated
New Storage	Not evaluated
Groundwater	Not evaluated
Elimination of unauthorized water use	Not separated from contracted space
Water Conservation	Not a viable source